General Discussions. Session 1.

Mike Welch – the focus of the work has been on small scale applications. Do you think that this is how the technology will be applied or will larger scale units be the way to go?
Matti Nieminen – small scale applications are generally technically feasible but the associated costs tend to be relatively high. However, there may be certain specific situations where it could be used. The most favourable option is for a large gasifier, co-gasifying sludge with other feedstocks. This would include a gas cleaning stage.
Karen Laughlin – is the feeling that fixed bed gasification is likely to be limited to smaller scale applications?
Sukru Solmaz – fixed bed systems can operate successfully on a large scale; for instance, the Lurgi-based methanol producing plant in East Germany. However, this plant has been politically motivated and associated costs are high. There have been a number of small scale wood gasification plant built in the UK, but these have all closed, mainly because of cost considerations.
Matti Nieminen – we consider 30-40 MWth to be the minimum viable size, although there may be special circumstances where this might not necessarily apply.
Ian Barnes – how is the potential market for these technologies viewed, especially in light of the reducing number of disposal options for sludge.
Sukru Solmaz – in Germany, requirements are being met increasingly through co-incineration. Gasification of sewage sludge is viewed generally as still being underdeveloped.
Mercury may present a problem as it is released in vapour form by gasification and incineration processes. HCN may also be a problem. Both oil and water scrubbers are required to fully remove organic species present. The *Rectisol* process is very effective in this respect, but can be relatively expensive. Overall, there are no easy solutions.
Graham Reed – are there any issues with organic mercury compounds such as methyl mercury? Is it possible that this could survive in the sludge?
Sukru Solmaz – mercury is never present initially in elemental form, although after incineration, up to 50% can be in this form. Overall, we have found only ~5% of mercury ends up in the gas phase.
Paul Bahta – what sort of capacities are available for Lurgi-based systems?
Sukru Solmaz – up to 80-120 MWth is available for various applications. There are several plants currently operating with mixed feedstocks (plastics, wood, etc). Some, such as demolition wood, can cause problems of tar formation. However, the gas may not be used in a gas turbine.
Mike Welch – VTT has carried out a lot of work on atmospheric air-blown gasification. Could pressurised systems be applied to sewage sludge?
Matti Nieminen – in principle, the answer is yes, although there may be technical risks and other problems. In Finland, water treatment plants use high levels of iron sulphide and potentially, its presence could result in problems of hot spots, etc. Atmospheric pressure systems have already been confirmed to work well.
Ian Evans – the presence of phosophorous may also impact on ease of ash disposal, etc.
Matti Nieminen – we have found gasification ash to be suitable as an agricultural fertiliser. Levels of heavy metals, potash, alkali compounds and phosphates have been acceptable.

Karen Laughlin – a few water companies have been exploring the potential of sludge gasification. How do the companies view the potential of the process?
Ian Evans – a lot of research has been carried out. Economic factors were comparable for those of sludge incineration. The problem that Anglian Water has is that the population in its area is not highly concentrated. As a result, transport costs become inhibitive when considering a large, centralised gasification facility.
Paul Bahta – would large scale plant be economic?
Ian Evans – potentially it could be economic on one or two sites, although most of the company's sludge would still require disposal elsewhere. Satellite drying has been considered, but costs still amount to ~£200/t; this is too expensive. The agricultural disposal route will probably continue to dominate for 5-10 years. The potential of gasification may then be reconsidered.
Paul Bahta – if a ban on the application of raw sludge was introduced, would the preferred alternative be incineration or gasification?
Ian Evans – gasification would be the prime candidate although other options could not be ignored. It is likely to be an economic issue, not a legislative one. Gasification is viewed as being flexible in terms of potential uses for the gas produced.
Ian Barnes – what do the delegates consider to be the outstanding technical issues and challenges? What still needs to be done?
Mike Welch – the main problem is persuading someone to build a full scale plant. It has been confirmed that the technology works although there are still technical and commercial risks involved. The main modules of the wood-based ARBRE gasification plant worked, but there were problems with sub-systems such as fuel handling. Although technically, the process worked, other factors led to its demise. Confirmation of technical viability is no guarantee of commercial success.